

**CLAIMS**

What is claimed is:

1. A method, comprising emitting an optical signal from a gas plasma that is RF inductively coupled to an integrated circuit including a gas plasma discharge device having an inductive coil,

wherein emitting includes magnetically energizing the inductive coil with the integrated circuit to induce a discharge from the gas plasma.

2. The method of claim 1, wherein the integrated circuit includes an oscillator and magnetically energizing the inductive coil includes magnetically energizing the inductive coil with the oscillator.

3. The method of claim 1, further comprising modulating data using at least one pulse modulation technique selected from the group consisting of pulse position modulation and pulse width modulation, wherein emitting is controlled at least in part by pulse modulated data.

4. The method of claim 1, further comprising capacitively energizing at least one member selected from the group consisting of a first capacitive coupling plate and a second capacitive coupling plate with the integrated circuit to facilitate the discharge from the gas plasma

5. The method of claim 1, wherein magnetically energizing the inductive coil includes the use of a differential drive to increase power.

6. The method of claim 1, further comprising illuminating the integrated circuit with actinic radiation to lower an ionization potential of the gas plasma.

7. The method of claim 1, further comprising applying an RF bias to the gas plasma and maintaining the RF bias to affect switch-on time of the gas plasma.

8. The method of claim 1, further comprising igniting the discharge with an electron emitter that is coupled to an optically and electronically conductive layer, wherein the gas plasma is

located between the integrated circuit and the optically and electronically conductive layer.

9. The method of claim 1, further comprising refracting the optical signal with an optically conductive layer that is optically coupled to the gas plasma.

10. The method of claim 1, further comprising diffracting the optical signal with an acousto-optic crystal that is optically coupled to the gas plasma.

11. A method of optically broadcasting modulated data to a plurality of optical detectors comprising the method of claim 1.

12. An apparatus, comprising an integrated circuit including gas plasma discharge device having an inductive coil,

wherein the inductive coil can be magnetically energized by the integrated circuit to induce a discharge in a gas plasma that is RF inductively coupled to the integrated circuit.

13. The apparatus of claim 12, wherein the integrated circuit further includes an oscillator and the inductive coil is magnetically energized by the oscillator.

14. The apparatus of claim 13, wherein the integrated circuit further includes a communications signal generator electrically coupled to the oscillator.

15. The apparatus of claim 13, wherein the integrated circuit further includes a power amplifier electrically coupled between the oscillator and the gas plasma discharge device.

16. The apparatus of claim 1, wherein the gas plasma discharge device includes a first capacitive coupling plate and a second capacitive coupling plate.

17. The apparatus of claim 12, further comprising an optical filter optically coupled to the integrated circuit.

18. The apparatus of claim 12, further comprising a source of actinic radiation optically

coupled to the integrated circuit to lower an ionization potential of the gas plasma.

19. The apparatus of claim 12, further comprising an optically and electronically conductive layer coupled to the integrated circuit, wherein the gas plasma is located between the integrated circuit and the optically and electronically conductive layer.

20. The apparatus of claim 19, further comprising an electron emitter that is coupled to the optically and electronically conductive layer, wherein the electron emitter is located between the gas plasma and the optically and electronically conductive layer.

21. The apparatus of claim 12, wherein the integrated circuit defines a void adjacent the inductive coil.

22. The apparatus of claim 12, wherein the integrated circuit includes an tunneling spark circuit.

23. The apparatus of claim 12, wherein the integrated circuit includes a heated electron emitter supply circuit.

24. The apparatus of claim 12, further comprising an optically conductive layer coupled to the integrated circuit

25. The apparatus of claim 24, wherein the optically conductive layer confines the gas plasma.

26. The apparatus of claim 25, wherein the optically conductive layer defines a substantially hemispheric containment shell.

27. The apparatus of claim 12, wherein the integrated circuit includes a dielectric layer located between the inductive coil and the gas plasma.

28. The apparatus of claim 12, wherein the inductive coil defines a substantially spiral coil.

29. The apparatus of claim 12, wherein the inductive coil includes an external dielectric coating.
30. The apparatus of claim 12, further comprising an acousto-optic crystal optically coupled to the gas plasma.
31. A computer node, comprising a plurality of integrated circuit gas discharge devices according to claim 12.
32. An optical backplane, comprising a plurality of integrated circuit gas discharge devices according to claim 12.
33. A method, comprising emitting an optical signal from an integrated circuit including a light source and an acousto-optic crystal optically coupled to the light source, wherein emitting includes diffracting the optical signal with the acousto-optic crystal.
34. The method of claim 33, wherein the optical signal is provided by a diode selected from the group consisting of a light emitting diode and a laser diode.
35. The method of claim 33, wherein the optical signal is provided by a gas plasma discharge device.
36. The method of claim 33, further comprising modulating data using at least one pulse modulation technique selected from the group consisting of pulse position modulation and pulse width modulation, wherein emitting is controlled at least in part by pulse modulated data.
37. The method of claim 33, wherein diffracting the optical signal includes diffracting the optical signal with an acousto-optic modulator.
38. The method of claim 33, wherein diffracting the optical signal includes diffracting the optical signal with an acousto-optic deflector.

39. A method of optically broadcasting modulated data to a plurality of optical detectors comprising the method of claim 33.
40. An apparatus, comprising an integrated circuit including a light source and an acousto-optic crystal optically coupled to the light source,  
wherein the acousto-optic crystal diffracts an optical signal from the light source.
41. The apparatus of claim 40, wherein the integrated circuit includes an acousto-optic modulator.
42. The apparatus of claim 40, wherein the integrated circuit includes an acousto-optic deflector.
43. The apparatus of claim 40, wherein the light source includes a diode selected from the group consisting of a light emitting diode and a laser diode.
44. The apparatus of claim 40, wherein the light source includes a gas discharge device.
45. The apparatus of claim 40, wherein the integrated circuit further includes a lens optically coupled to the acousto-optic modulator.
46. A computer node, comprising a plurality of integrated circuits according to claim 40.
47. An optical backplane, comprising a plurality of integrated circuits according to claim 40.
48. A method, comprising emitting an optical signal from an integrated circuit including an acousto-optic crystal and a lens optically coupled to the acousto-optic modulator,  
wherein emitting includes diffracting the optical signal with the acousto-optic crystal.
49. The method of claim 48, wherein the optical signal is provided by a diode selected from the group consisting of a light emitting diode and a laser diode.

50. The method of claim 48, wherein the optical signal is provided by a gas plasma discharge device.
51. The method of claim 48, further comprising modulating data using at least one pulse modulation technique selected from the group consisting of pulse position modulation and pulse width modulation, wherein emitting is controlled at least in part by pulse modulated data.
52. The method of claim 48, wherein diffracting the optical signal includes diffracting the optical signal with an acousto-optic modulator.
53. The method of claim 48, wherein diffracting the optical signal includes diffracting the optical signal with an acousto-optic deflector.
54. A method of optically broadcasting modulated data to a plurality of optical detectors comprising the method of claim 48.
55. An apparatus, comprising an integrated circuit including an acousto-optic crystal and a lens optically coupled to the acousto-optic crystal,  
wherein the acousto-optic crystal diffracts an optical signal and the lens diffracts the optical signal.
56. The apparatus of claim 55, wherein the integrated circuit includes an acousto-optic modulator.
57. The apparatus of claim 55, wherein the integrated circuit includes an acousto-optic deflector.
58. The apparatus of claim 55, wherein the integrated circuit further includes a light source.
59. The apparatus of claim 58, wherein the light source includes a diode selected from the group consisting of a light emitting diode and a laser diode.

60. The apparatus of claim 58, wherein the light source includes a gas plasma discharge device.
61. A computer node, comprising a plurality of integrated circuits according to claim 55.
62. An optical backplane, comprising a plurality of integrated circuits according to claim 55.
63. A method, comprising emitting an optical signal from a gas plasma that is capacitively coupled to an integrated circuit including a gas plasma discharge device having a first capacitive coupling plate and a second capacitive coupling plate,  
wherein emitting includes capacitively energizing at least one member selected from the group consisting of the first capacitive coupling plate and the second capacitive coupling plate with the integrated circuit to induce a discharge from the gas plasma.
64. The method of claim 63, wherein the integrated circuit includes an oscillator and energizing includes capacitive energizing the gas plasma discharge device with the oscillator.
65. The method of claim 63, further comprising modulating data using at least one pulse modulation technique selected from the group consisting of pulse position modulation and pulse width modulation, wherein emitting is controlled at least in part by pulse modulated data.
66. The method of claim 63, further comprising magnetically energizing an inductive coil with the integrated circuit to facilitate the discharge from the gas plasma.
67. The method of claim 63, wherein energizing includes the use of a differential drive to increase power.
68. The method of claim 63, further comprising illuminating the integrated circuit with actinic radiation to lower an ionization potential of the gas plasma.
69. The method of claim 63, further comprising applying an RF bias to the gas plasma and

maintaining the RF bias to affect switch-on time of the gas plasma.

70. The method of claim 63, further comprising igniting the discharge with an electron emitter that is coupled to an optically and electronically conductive layer, wherein the gas plasma is located between the integrated circuit and the optically and electronically conductive layer.

71. The method of claim 63, further comprising refracting the optical signal with an optically conductive layer that is optically coupled to the gas plasma.

72. The method of claim 63, further comprising diffracting the optical signal with an acousto-optic crystal that is optically coupled to the gas plasma.

73. A method of optically broadcasting modulated data to a plurality of optical detectors comprising the method of claim 63.

74. An apparatus, comprising an integrated circuit including gas plasma discharge device having a first capacitive coupling plate and a second capacitive coupling plate,  
wherein the first capacitive coupling plate and the second capacitive coupling plate can be capacitively energized by the integrated circuit to induce a discharge in a gas plasma that is capacitively coupled to the integrated circuit.

75. The apparatus of claim 74, wherein the integrated circuit further includes an oscillator and the gas plasma discharge device is capacitively energized by the oscillator.

76. The apparatus of claim 75, wherein the integrated circuit further includes a communications signal generator electrically coupled to the oscillator.

77. The apparatus of claim 75, wherein the integrated circuit further includes a power amplifier electrically coupled between the oscillator and the gas plasma discharge device.

78. The apparatus of claim 1, wherein the gas plasma discharge device includes an



inductive coil.

79. The apparatus of claim 74, further comprising an optical filter optically coupled to the integrated circuit.

80. The apparatus of claim 74, further comprising a source of actinic radiation optically coupled to the integrated circuit to lower an ionization potential of the gas plasma.

81. The apparatus of claim 74, further comprising an optically and electronically conductive layer coupled to the integrated circuit, wherein the gas plasma is located between the integrated circuit and the optically and electronically conductive layer.

82. The apparatus of claim 81, further comprising an electron emitter that is coupled to the optically and electronically conductive layer, wherein the electron emitter is located between the gas plasma and the optically and electronically conductive layer.

83. The apparatus of claim 74, wherein the integrated circuit defines a void adjacent at least one member selected from the group consisting of the first capacitive coupling plate and the second capacitive coupling plate.

84. The apparatus of claim 74, wherein the integrated circuit includes an tunneling spark circuit.

85. The apparatus of claim 74, wherein the integrated circuit includes a heated electron emitter supply circuit.

86. The apparatus of claim 74, further comprising an optically conductive layer coupled to the integrated circuit

87. The apparatus of claim 86, wherein the optically conductive layer confines the gas plasma.

88. The apparatus of claim 87, wherein the optically conductive layer defines a substantially hemispheric containment shell.

89. The apparatus of claim 74, wherein the integrated circuit includes a dielectric layer located between at least one member selected from the group consisting of the first capacitive coupling plate and the second capacitive coupling plate and the gas plasma.

90. The apparatus of claim 74, wherein the first capacitive coupling plate and the second capacitive coupling plate are substantially parallel and not coplanar.

91. The apparatus of claim 74, wherein the first capacitive coupling plate and the second capacitive coupling plate are substantially parallel and substantially coplanar.

92. The apparatus of claim 74, further comprising an acousto-optic crystal optically coupled to the gas plasma.

93. A computer node, comprising a plurality of integrated circuit gas discharge devices according to claim 74.

94. An optical backplane, comprising a plurality of integrated circuit gas discharge devices according to claim 74.